

WHAT IS CLAIMED IS:

1. An insulating element for a battery pack comprising:
a lower sheet member;
5 at least one side wall sheet member; and
an upper sheet member;

wherein each sheet member comprises a sheet or mat of inorganic fibers, and the sheet members combine with one another to form an insulated cavity bounded by (i) the lower sheet member, (ii) the at least one side wall sheet member, and (iii) the upper sheet member; and
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wherein one or more sheet members further comprise an attaching member on the sheet member opposite the insulating cavity, said attaching member comprising a pressure-sensitive adhesive layer, a hot melt adhesive layer, a structural adhesive layer, a hook and loop type fastener, a headed fastener, or a combination thereof.
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2. The insulating element of claim 1, wherein the at least one side wall sheet member comprises two or more separate side wall sheet members, each of which is attached to the lower sheet member, the upper sheet member, or both.

20 3. The insulating element of claim 1, wherein each sheet member comprises a nonwoven fabric of inorganic fibers.

4. The insulating element of claim 1, wherein said inorganic fibers are alumina fibers, aluminosilicate fibers, glass fibers, graphite fibers, boron fibers, alumina
25 borosilicate fibers, calcia-magnesium silicate fibers, silicon carbide fibers, annealed ceramic fibers, quartz fibers, or a mixture thereof.

5. The insulating element of claim 3, wherein said inorganic fibers are glass fibers, refractory ceramic fibers, or a mixture thereof.
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6. The insulating element of claim 1, wherein each sheet member consists essentially of sized or unsized inorganic fibers.

7. The insulating element of claim 1, wherein the attaching member comprises a pressure-sensitive adhesive layer.

5 8. The insulating element of claim 1, wherein the attaching member comprises a pressure-sensitive adhesive layer and a hot melt adhesive layer between the sheet member and the pressure-sensitive adhesive layer.

10 9. The insulating element of claim 8, wherein one or more sheet members further comprise an intermediate layer between the hot melt adhesive layer and the pressure sensitive adhesive layer.

15 10. The insulating element of claim 9, wherein the intermediate layer comprises a polymeric scrim, a nonwoven fabric, a woven fabric, a foam, a film, or a combination thereof.

11. The insulating element of claim 1, wherein the sheet members are portions of a single sheet.

20 12. The insulating element of claim 1, wherein one or more of the sheet members are molded sheet members.

25 13. A molded insulating element for a battery pack comprising one or more molded sheet members, wherein each sheet member comprises a sheet or mat of inorganic fibers, and the sheet members combine with one another to form an insulated cavity bounded by (i) a lower sheet member, (ii) at least one side wall sheet member, and (iii) an upper sheet member.

30 14. The molded insulating element of claim 13, wherein at least a portion of the at least one side wall sheet member is in a plane substantially perpendicular to the lower sheet member, the upper sheet member, or both; and the at least one side wall sheet

member forms one or more side walls along a perimeter of the lower sheet member, the upper sheet member, or both.

5 15. The molded insulating element of claim 13, wherein each of the sheet members is a molded sheet member.

10 16. An insulating element assembly comprising the insulating element of claim 1, and a housing comprising (i) a lower tray, (ii) one or more tray side walls, and (iii) a removable lid, said insulating element sized so as to be positioned within a tray cavity formed by (i) the lower tray, (ii) the one or more tray side walls, and (iii) the removable lid.

15 17. A battery pack assembly comprising the insulating element of claim 1 and a battery pack.

18. The battery pack assembly of claim 17, wherein the battery pack is positioned within the insulating cavity of the insulating element.

20 19. A battery pack assembly comprising the molded insulating element of claim 13 and a battery pack.

20. The battery pack assembly of claim 19, wherein the battery pack is positioned within the insulating cavity.

25 21. A battery pack assembly comprising the insulating element assembly of claim 16 and a battery pack.

30 22. An insulating element assembly for a battery pack comprising:
(a) a housing comprising:
a lower tray,
one or more side walls, and

a lid that is attachable to the tray, the one or more side walls, or both, said housing having a tray cavity formed by (i) the lower tray, the one or more side walls, and (iii) the lid; and

(b) an insulating element comprising:

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a lower sheet member;

at least one side wall sheet member; and

an upper sheet member;

wherein each sheet member comprises a sheet or mat of inorganic fibers, and wherein the sheet members combine with one another to form an insulated cavity within the tray cavity.

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23. The insulating element assembly of claim 22, wherein the lower sheet member is positioned on an inner surface of the lower tray; the at least one side wall sheet member is positioned on an inner surface of each of the one or more side walls; and the upper sheet member is positioned on an inner surface of the lid.

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24. The insulating element assembly of claim 22, wherein the at least one side wall sheet member is attached to the lower sheet member, the upper sheet member, or both.

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25. The insulating element assembly of claim 22, wherein the insulating element comprises a single sheet of inorganic fibers comprising the lower sheet member, the one or more side wall sheet members, and the upper sheet member.

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26. The insulating element assembly of claim 22, wherein one or more sheet members of the insulating element comprise molded sheet members.

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27. The insulating element assembly of claim 22, wherein the one or more side walls are permanently attached to the tray, the lid, or both; and the lid is attachable to the tray, the one or more side walls, or both.

28. The insulating element assembly of claim 22, wherein each sheet member consists essentially of sized or unsized inorganic fibers.

29. The insulating element assembly of claim 22, wherein one or more sheet members are attached to the housing via an attaching member on the one or more sheet members, said attaching member comprising a pressure-sensitive adhesive layer, a hot melt adhesive layer, a structural adhesive layer, a hook and loop type fastener, a headed fastener, or a combination thereof.

30. A battery pack assembly for providing power for a vehicle comprising:
a battery pack; and
the insulating element assembly of claim 22.

31. A battery pack assembly for providing power for a vehicle comprising:
a battery pack; and
an insulating element to insulate said battery pack, said insulating element comprising:

a lower sheet member;
at least one side wall sheet member; and
an upper sheet member;

wherein each sheet member comprises a sheet or mat of inorganic fibers, and wherein the sheet members combine with one another to form an insulated cavity at least partially surrounding said battery pack, said insulated cavity being bounded by (i) the lower sheet member, (ii) the at least one side wall sheet member, and (iii) the upper sheet member.

32. The battery pack assembly of claim 31, further comprising a housing, said housing comprising (i) a lower tray, (ii) one or more side walls, and (iii) a lid that is attachable to the lower tray, the one or more side walls, or both; said battery pack being mountable in said housing with said insulating element being disposed between said battery pack and said housing.

33. The battery pack assembly of claim 31, further comprising a heater for warming said battery pack.

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34. A vehicle comprising the battery pack assembly of claim 31.

35. The vehicle of claim 34, wherein the vehicle is a hybrid vehicle, which runs on (i) gas or diesel and (ii) electricity.

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36. A method of insulating a battery pack in a vehicle comprising:
providing a battery pack;
at least partially surrounding the battery pack with the insulating element of claim 1.

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37. A method of maintaining a battery pack in a vehicle within a temperature range, said method comprising:
providing a battery pack;
at least partially surrounding the battery pack with the insulating element of claim 1.